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SCIENCE INTERACTING WITH PHILOSOPHY:

THE CASE OF LUDWIG WITTGENSTEIN

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Abstract

Rom Harré has recently proposed that there is a difference between the driving force behind the early and the later Wittgenstein. According to Harré, in the early work, the major inspiration came from science, while, in the later, it came from religion. I show that only Harré's first proposal is fully justified. In section one of my paper, I examine the picture theory, the theory of truth-functions, the meaning of propositions, and *Tractatus* §6.3. In section two, about the *Philosophical Investigations*, I show that Harré is misleading. In a first step, I argue that science plays the same role in this later work as in the *Tractatus*, namely the role of *source of inspiration*. In a second step, I show that science plays also the role of a *contrast* against which the rich world of meaning can be discerned. I examine this contrastive role not only as regards religion, but also as regards psychology, and as regards the repercussions of Wittgenstein's later work on science-studies. My final proposal is that the distinction between science as source of inspiration and science as a contrast goes beyond Wittgenstein: it characterises much twentieth century philosophical work in this area.

Ludwig Wittgenstein has left a lasting trace on analytic philosophy at various crucial stages in its development, especially in what concerns logical positivism, ordinary language philosophy and current philosophy of psychology. He started his philosophical studies at Cambridge under Bertrand Russell after completing a degree in engineering. An interesting historical question is: which discipline was more influential on his subsequent work? Was it engineering or Russell's philosophy? This question has attracted the attention of a number of scholars. The main objective has been to trace the historical development that led to the *Tractatus Logico-Philosophicus*. My aim in this paper is to engage in this debate within a broader context. I will concentrate on Wittgenstein as a case study so as to be in a position to extract some principles regarding the more general question of how natural science may interact fruitfully with philosophical thought. The paper is essentially divided in two sections corresponding to Wittgenstein's two major works, the *Tractatus* and the *Philosophical Investigations*. The basic question in these sections is: what role is science playing in the philosophical work of this author?

1. The *Tractatus*

How scientific thinking can affect philosophy has been extensively studied with respect to the Vienna Circle and the ensuing school of logical positivism. The particular case of Wittgenstein's *Tractatus* is arguably more significant than the work

of the Vienna Circle. The reason is simple. While logical positivism has been recognised as an intellectual adventure that ended in failure, at least when conceived in its more radical form, the arguments in the *Tractatus* still attract considerable attention by many philosophers. My first step will be to examine how science has affected the philosophical doctrine of the *Tractatus*. As a suitable starting point for this task, I will consider Rom Harré's recent study of the origins of Ludwig Wittgenstein's philosophy.¹ I take this paper as a point of reference because, to my knowledge, it is the most recent treatment of the question.

The basic claim Harré wants to defend in the first part of his article concerns the origins of the Tractarian viewpoint. He offers a number of important arguments for the claim that the early Wittgenstein drew more inspiration from the scientific world-view of his time than from his mentor Russell. This claim goes against some popular affirmations that seem to have already crystallised into standard historical interpretations. It goes against those historians who try to identify links between Russell's logical constructionism and Wittgenstein's ideas. For instance, M.J.S. Hodge and G.N. Cantor start their study of the development of philosophy of science in the twentieth century from the observation that Russell's logical constructionism proceeded according to the guiding principle in the *Principia Mathematica*, namely the principle aimed at determining the fundamental pre-suppositions of the various sciences out of which qualities can be constructed. This is essentially a logical exercise concerned with the clarification of the language of science. They then relate this simplistically to Wittgenstein. They suggest that the *Tractatus* can be seen as the realisation of this programme to its full extent.² There are clear indications, however, that the main source of influence on the young Wittgenstein lies elsewhere. The *Tractatus* is in fact more influenced by the natural philosophy of scientists like Hermann von Helmholtz, Heinrich Hertz and Ludwig Boltzmann, than by Russell's empiricist background. It is extremely likely that Wittgenstein used his technical competence in applied physical science to start off from a mechanical model. More precisely, he makes a novel application of the mental model of mechanics. In other words, he applies some basic ideas that are fundamental in the description of motion. A mechanical model provides the form of theories restricted to the possible motions of material things. Wittgenstein applies such a model to the realm of philosophy. The result is his claim that logic provides the form of the general theory of the world.

This is the basic suggestion put forward by Rom Harré. He offers a number of justifying reasons clustered around three main characteristics of the logical doctrines of the *Tractatus*, namely the picture theory, the theory of truth-functions, and the account of the meaning of propositions. I will consider each one in turn.

Harré's argument

Wittgenstein's picture theory of meaning is related to models. There is little doubt about this. To appreciate this, consider, for instance, some pieces of paper. These can be used to represent an arrangement of furniture in a room. There is no need for the pieces of paper to share the shape of the furniture they represent. It is sufficient for them to be in a spatial relation between them that is isomorphic to that

¹ Rom Harré, 'Wittgenstein: Science and Religion'. Previous studies not discussed in my paper include: P. Barker, 'Hertz and Wittgenstein'; K. Hamilton, *Hertz and Wittgenstein: The Philosophical Significance of Wittgenstein's Scientific Training*.

² M.J.S. Hodge and G.N. Cantor, 'The Development of Philosophy of Science since 1900'.

of the actual furniture. Wittgenstein's idea in the *Tractatus* is that the elements within a proposition act just like such pieces of paper. In themselves, they do not resemble the state of affairs. The proposition, however, has a pictorial form that is isomorphic to the state of affairs. This accounts for us saying that the proposition depicts the state of affairs. Moreover, such isomorphism is very often noticeable only through analysis. What Wittgenstein calls a state of affairs is a possible arrangement of an object with respect to other objects. If this state of affairs obtains, it is a fact. A representation of a state of affairs is a picture. Propositions are logical pictures that can be either true or false. In this way, the world as the totality of facts, can be depicted by propositions that share the same multiplicity with what they depict.

Harré sees here a direct application of basic ideas expressed by Heinrich Hertz in his work *The Principles of Mechanics*, published in 1894. Hermann von Helmholtz and Ludwig Boltzmann are never mentioned explicitly in the *Tractatus*. Heinrich Hertz, however, is mentioned twice. This is certainly very significant, given Wittgenstein's style of avoiding practically all kinds of references to other philosophical work. In *Tractatus* 4.04 we find:

In the proposition there must be exactly as many things distinguishable as there are in the state of affairs, which it represents.

They must both possess the same logical (mathematical) multiplicity (cf. Hertz's *Mechanics*, on Dynamic Models)

Hertz is also mentioned in *Tractatus* 6.361:

In the terminology of Hertz we might say: only *uniform* connections are *thinkable*.

The influential ideas of Hertz include an explicit mention of images or symbols of physical objects. The physicists' use of models allows them to call some models correct, and others incorrect. In general, a model is correct when both it and the object it is a model of share the same form. Similar precursory ideas can be found in the works of another contemporary physicist, Ludwig Boltzmann, who discussed the idea of simple elements in the context of physics. His working hypothesis was that mechanical models are manifolds of simple elements that must remain forever inexplicable because of their ultimate role in explanation. This is a clear source of the *Tractarian* doctrine of simples. For Wittgenstein, simple objects are unanalysable entities such as spatio-temporal points. Such observations are rightly taken by Harré as a justification of his claim that the picture-theory of meaning is essentially an application of scientific ideas rather than of Russellian principles.

The second major characteristic of the logical doctrine of the *Tractatus* is the theory of truth-functions. This doctrine, just like the picture-theory, can be traced back to basic ideas expressed in the scientific works. Harré illustrates the striking similarity between, on the one hand, Wittgenstein's idea of a truth-table representation of a proposition and, on the other hand, what scientists call phase-space. To understand this term, think of a given material system with a set of variable attributes. A convenient example can be a planetary system like the solar system. For such a system, there are some configurations that are possible and some that are not. The term 'phase-space' in science refers to an imaginary volume that contains all the possible configurations of these variables. It is basically a mathematical idea that

allows us to chart the history of the system. The actual history of the system is a set of points in phase-space. These set of points constitute a line. The actual history of the system corresponds therefore to a trajectory of a point in phase-space. Harré makes the interesting observation that Wittgenstein's truth-table representation of a proposition is a direct application of the idea of phase-space in physics. A very clear indication of this is Wittgenstein's discussion of possibilities in *Tractatus* 4.27 and 4.28:

With regard to the existence of n atomic facts there are $K_n = \sum_{v=0}^n \binom{n}{v}$ possibilities.

It is possible for all combinations of atomic facts to exist, and the others not to exist.

To these combinations correspond the same number of possibilities of the truth – and falsehood – of n elementary propositions.

In simple terms, the equation included above gives the total number of ways a group of n objects can be subdivided into smaller groups. Wittgenstein's use of this equation shows his remarkable dependence on purely scientific methods in philosophy. We must recall that, in his overall Tractarian world-view, the form of a simple object consists essentially in the combinatorial possibilities with other objects. The possible ways of linking one object with other objects constitute a state of affairs. Harré is right in highlighting the importance of the connection between Hertz's and Boltzmann's use of phase-space and Wittgenstein's original application of it to state of affairs, that may or may not obtain.

The third characteristic of the logical doctrine of the *Tractatus* involves the meaning of propositions. Harré argues against the idea that Wittgenstein simply employs Russellian categories. Russell had defended the idea that we are acquainted with simple objects whose names constitute the elements, the building blocks, constituting propositions. In broad terms, we can say that, on this view, our intelligence starts from the simple and proceeds to the complex. Harré shows that there are convincing reasons to hold that Wittgenstein, even as early as in the *Tractatus*, held that our intelligence starts with grasping the proposition as a whole.

The entire discussion centres on whether we understand a sentence by joining up our understanding of the separate words, or not. Does it make sense to claim that a person can understand a sentence even though he does not proceed by understanding first each word the sentence contains and then combining all these meanings together? One element of novelty in the *Tractatus* lies precisely here. Wittgenstein gives some indication that there is an understanding at the level of the individual constitutive parts, and there is another kind of understanding at the level of the whole, the level of the form. When he says that 'every statement about complexes can be analysed into a statement about their constituent parts' in paragraph 2.02 of the *Tractatus*, he is not saying anything about understanding the complex only after understanding the simples. The simples, in fact, cannot be objects of acquaintance.

This becomes evident when the source of Wittgenstein's inspiration, at least on this point, is rightly seen to be his scientific background as opposed to Russell's philosophy — as opposed, that is, to Russell's theory of acquaintance. In the science

of gases, for instance, physicists knew that the general gas law relating pressure, volume and temperature, $PV = RT$, is true even before they acquired a knowledge of what constitutes pressure. They knew the gas law, that is, before they acknowledged the acceptability of the kinetic theory of gases, that practically explains the terms in the gas laws in terms of gas particles. This historical detail shows that, in general, we acknowledge the truth of the law independently of any micro-description that may be discovered later. The law is true at its level of generality, and the micro-description at another level. Harré's suggestion is that Wittgenstein is directly applying this scientific model to his philosophical inquiry. Wittgenstein is practically drawing a close parallel between science and philosophy as follows: general law is to gas-particle description as logical form is to knowledge of simple objects. This means that, in both cases, we know the first independently of our knowledge of the second. There is no denial here that the micro-description *accounts for* the macro-description. Even though the micro-description accounts for the macro-description, neither one nor the other is redundant. When Wittgenstein applies this point to ontology, the scientific idea of micro-description is taken to its limit and, as Socrates had already understood, knowledge of simples is impossible. Wittgenstein agrees with this. He is very far from Russell's ideas of knowledge by acquaintance.

Here again, therefore, we can see that Harré's arguments are convincing. Within the three areas considered, namely the picture-theory, the theory of truth-functions and the area of the meaning of propositions, Wittgenstein draws direct inspiration not from Russellian philosophy but from natural science.

Tractatus 6.3

It is interesting to follow and extrapolate these proposals sketched by Harré and see whether the section of the *Tractatus* most explicitly dealing with natural science supports them or not. The section I have in mind is section 6.3 and all its subordinate paragraphs. Wittgenstein starts off from the affirmation that logical research means the investigation of all reality. As an elaboration of this claim, there follows a discussion in seven paragraphs. The first two discuss laws. The first mentions the law of induction, the second the law of causation. Wittgenstein's claim here is that the law of causality is not a law but one particular accepted *form* of law. The form of law is like a template that is imposed by logic on physicists. In 6.3211 we find: 'Men had indeed an idea that there must be a "law of least action", before they knew exactly how it ran.' The same may be said about other forms of law, such as the law of causation, or minimum laws in mechanics.

Wittgenstein's analysis here comes very close to Immanuel Kant's. When Wittgenstein says that the law of causation, as a proposition, is an a priori intuition of a possible form of scientific proposition, he is showing his indebtedness to Kant. My suggestion here is not that Wittgenstein wrote these paragraphs with the *Critique of Pure Reason* before him. The influence was not direct, but via Wittgenstein's scientific background. The scientist Helmholtz had adjusted Kant's general concept of *Vorstellung* (representation) to fit his philosophical understanding of scientific work. For natural science, Helmholtz started considering representations as modes of *acquired* presentation. The scientist acquires such habits through unconscious inferences, or sensations, and systematic work. These are Helmholtz's ideas. In Wittgenstein, they become elements of philosophical method. It is very probable that they constitute the origins of his claim that we can know the law of least action before

knowing exactly how it runs. This section of the *Tractatus*, therefore, adds another crucial point that further consolidates Harré's claims.

Further down in Wittgenstein's section on natural science, section 6.3, we find his famous image of the net (*Netz*) with either triangular or square shapes. He explains how we can use the idea of a fine net to describe the real, somewhat like what we find in a black and white photograph made up of an arrangement of a large number of black and white pixels. The photographic resolution corresponds to the size and quantity of pixels. His point is that, whatever basic figure constitutes the netting, the process of obtaining a correct description of the real world by making the net sufficiently fine will always be a success. The choice between 'triangular netting' and 'square netting' is not very important. In this analogy, the law of causation corresponds to the network and not to what the network describes. This helps us understand in what sense this law of causation is an example of a *form* of a law. The Kant-Hertz influence is again evident in paragraph 6.361 already alluded to above: 'In the terminology of Hertz we might say: only *uniform* connections are *thinkable*.' Here, the uniformity is a condition of intelligibility. Saying that the world is uniform is not describing the world.

The final reflection in Tractarian treatment of natural science includes the interesting reference to the idea of God as an explanation-stopper. Many people think that the laws of nature have the special role of stopping an explanation, as if the question: 'why is there such a law?' had no meaning. Such people think that the only valid intellectual task is to explain the natural phenomenon by uncovering the general law of which that phenomenon is a particular instance. Wittgenstein insists that, in this, they are mistaken. They forget that we can still discuss, and often ought to discuss, the form of the laws that have been adopted in the first place, adopted sometimes arbitrarily, sometimes not. Wittgenstein recalls that the use by the ancients of God as final cause, in the sense of ultimate explanation, was an explanation-stopper in the same sense as the laws can be for many moderns. The ancients, however, were more honest. They accepted that humans cannot fully understand God. So the ancients had the possibility, which many moderns lack, of holding that there exists an explanation-stopper even though we cannot understand it fully. The moderns seem incapable of holding both these theses together — or worse, they are unwilling to hold them together. They slide into a false attitude of making it 'appear as though *everything* were explained' once the laws have been identified.³

From this analysis of the text of *Tractatus* 6.3, I can at least reaffirm that natural science is certainly a point of philosophical interest for Wittgenstein. As I remarked above, Rom Harré does not engage directly with this part of the *Tractatus*. His suggestion that Wittgenstein was definitely influenced by scientific ideas as regards the basic doctrines of the picture theory, the theory of truth-functions and the

³ The quote is from *Tractatus* 6.372. Wittgenstein uses the term 'the ancients' most probably to refer to philosophers like St. Thomas Aquinas who was aware of the role the ultimate cause should play in our effort to explain things. He was quite clear about this as an explanation-stopper even though he did not have the sophisticated scientific knowledge we have today. In a text dated 1264, we find: 'So when we ask the why of any natural effect we can give a reason as an immediate cause as long as we recognise that its ultimate cause is God's will. So you can ask: Why does wood become hot in the presence of fire?, and answer: Because heating is an activity native to fire. And this because heat is its characteristic property. And this because of the form that defines fire. And so on till we come to God's will. To answer, because it is God's will, to the initial question about why wood gets hot is appropriate if you want to derive the question all the way back to the ultimate cause, but inappropriate if you are trying to exclude all the other causes.' *Summa contra Gentiles*, 3, 97.

meaning of propositions can be appreciated even more through a study of this section 6.3. It seems reasonable to hold that, in this section, Wittgenstein moved in full circle. In the course of the entire project of the *Tractatus*, he drew inspiration primarily from natural science, used this inspiration to formulate some basic philosophical principles about propositions and objects, and then returned to discuss the workings of natural science in a new light. If Harré's arguments are solid as regards the early Wittgenstein, can the same be said as regards the later?

2. The *Philosophical Investigations*

As an introductory note for this section on the *Philosophical Investigations*, I would like to highlight a detail concerning the relation between the early and the later works of Wittgenstein. The 1953 edition of the *Philosophical Investigations* contains an interesting preface written by Wittgenstein in 1945. His aim includes an attempt to situate his philosophical position at the end of his career with respect to what it was at the beginning. He expresses his first inclination of publishing the *Philosophical Investigations* together with the *Tractatus* so that the latter will form a kind of background, or contrast, to the former. His judgement on the contents of the *Tractatus* can be seen in this paragraph as negative. The only function he could think of for his earlier work was to play a negative role. In the following paragraph of this preface, however, there is a clear indication that his comprehensive judgement is even more severe. He writes, 'I have been forced to recognise grave mistakes in what I wrote in that first book.' The conclusion that must be drawn for such a comment is that, whatever elements of continuity may be established by scholars between the first and the second Wittgenstein, his own thoughts about it indicate, beyond a shadow of doubt, a clear breach.

Perhaps it is this point that made Rom Harré distinguish clearly between the two works as regards the guiding principle or source of inspiration. According to him, the original inspiration for much of what lies in the *Tractatus* was drawn from the physics of Hertz and other physicists. As regards the *Philosophical Investigations*, Harré looks for another basic mental model acting as the source of inspiration. His reasoning seems to have been as follows. If Hertz's mechanical doctrines were at the origin of much of what the *Tractatus* contains, and if the *Philosophical Investigations* is essentially a kind of Tractarian anti-thesis, or, perhaps better, an assortment of anti-Tractarian theses, then the basic model must have changed. Harré thereby emphasises the discontinuity. He identifies the second mental model as the religious one. Although his arguments justifying this claim are interesting and stimulating, it seems that his overall reasoning is at best insufficient and at worst misleading. I will argue that natural science as a paradigm is still very present in the *Philosophical Investigations*. Its role is different, but this does not mean that the later work is less involved with science than the earlier one.

Harré on religion

The starting point for Harré is the famous affirmation by Wittgenstein concerning his religious point of view. In Norman Malcolm's study, Wittgenstein is quoted as saying: 'I am not a religious man but I cannot help seeing every problem

from a religious point of view.’⁴ This is an intriguing remark. The claim that he is not a religious man probably refers to the fact that he did not consider himself a member of a church or a religious community. From such a claim, Harré wants to argue that Wittgenstein’s personal religious struggle is the same struggle that animates his later philosophy. In other words, he urges that what shapes Wittgenstein’s later philosophy is religion. There are two major steps in his argument.

First, there is the fact that Christianity had a great appeal to Wittgenstein. I think Harré is right in pointing out that Wittgenstein, all through his life, was very much concerned about his own personal commitment. It became increasingly clear to him that, on the one hand, the religious cannot be dismissed to the realm of silence in the style of the last verses of the *Tractatus*. On the other hand, religious discourse seems to be the discourse most in need of therapy. It seems to be the discourse most vulnerable to the kind of philosophical disturbance Wittgenstein felt himself called to remedy.

The second of Harré steps in his reasoning concerns the nature of a philosophical problem. For many readers, the later Wittgenstein seems clear about how the so-called perennial philosophical problems should be treated. He did not look for solutions but for ways of defusing such problems. Instead of getting sucked into the problems, he looked for the conceptual confusions that may be at the bottom of the problem. Once these foundations are cleared, the problem disappears. Harré seems convinced that this stance is linked to Wittgenstein’s struggle to live a life of integrity within the frame of Christianity. Two sub-questions branch out at this point. Question one is: how can one be religiously committed in the face of the apparent implausibility of what Christianity claims in its assertions? Question two: how can one understand sin, in the sense of persistent failure of living up to the demands of rules of conduct leading to virtue?

Question one leads Harré to explore Wittgenstein’s crucial ideas about how language can bewitch the language-user. Some language-games share a superficial structure with others. This makes the language-users assume erroneously that the two language-games accomplish the same kind of task. Scientific language-games are used to explain through the evaluation of theories. Such theories are constructed with the aim of representing a mind-independent reality. One major element in such language-games is the presence of theoretical entities: entities that are postulated as existing in order to account for what we experience. A good example of a theoretical entity is the electron. The electron was assumed to exist because its existence facilitated the explanation of phenomena related to electricity. Our theories using electrons as theoretical entities have by now proved themselves so well-corroborated that we talk of *having discovered* the electron. We often forget that the single electron is, and will always remain, unobservable. One of the major original ideas of the later Wittgenstein is that language-games that *look* like a scientific explanation need not be concerned at all with hidden entities to account for phenomena. Religious discourse, when it looks like a scientific theory, tempts its users to assume that it is meant to accomplish one thing when in fact it is meant to accomplish another. It tempts its users to assume that it is meant to explain in the scientific sense.

This was question one of Harré’s two sub-questions related to the nature of philosophical problems. Question two concerns the failure of living up to rules. Rather quickly, Harré states that Wittgenstein’s analysis of rule-following dismisses two opposing views. It dismisses the idea that rules *cause* regular behaviour. It

⁴ N. Malcolm, *Wittgenstein: a religious point of view?*

dismisses also the view that rules *describe* such causes of regular behaviour. Wittgenstein's long and intricate arguments show that rule-following has undoubtedly nothing to do with causal links. Rule-following is a way of living one's commitment to a community. This holds whether one is referring to rules determining the meaning of words or to rules determining the meaning of life. Although a detailed examination of Wittgenstein's inquiry on rule-following lies outside the scope of this paper, it is worthwhile mentioning here that his position is not purely conventional. He is not saying that what is often called the mind-independent world is irrelevant for rule-following. The major point of significance for us here is that the role of belonging to a community becomes central.⁵ The bulk of Wittgenstein's analysis of rule-following is concerned with the meaning of words. There are, however, some written excerpts that show how he also applied this to the following of rules of life. 'Rules of life' refers here to rules meant to help one become virtuous. Harré quotes a saying of Wittgenstein as follows: 'It strikes me that a religious belief could only be something like a passionate commitment to a system of reference. Hence, although it's *belief*, it's really a way of living or a way of assessing life. [...] Instruction in a religious faith, therefore, would have to take the form of a portrayal, a description, of that system of reference whole.'⁶ Religion is therefore a matter of committing oneself to a community.

These two questions are taken by Harré as features of Wittgenstein's doctrine that offers considerable support to the claim that what shapes Wittgenstein's later philosophy is his religious struggle. Harré takes this to be an observation in parallel with the proposal that Wittgenstein's early philosophy was shaped by his scientific background.

My disagreement with Harré starts here. It does not arise because I want to claim that the religious point of view is not present at all in the later Wittgenstein. I am certainly in agreement with him on the presence of this important stance. Harré is right in saying that religion was a kind of 'subterranean shaping influence'.⁷ He is, however, wrong in giving the impression that natural science plays only an insignificant role in the later works. My allegation arises because a number of points in the *Philosophical Investigations* show clearly that the scientific paradigm is still very present. The presence of this paradigm is visible in two distinct ways. The first way corresponds to the same role science plays in the *Tractatus*, namely the role of a *source of inspiration* from which Wittgenstein could draw useful models for a philosophical representation of the world. The second way corresponds to a role absent from the *Tractatus*, namely the role of being a *contrast* against which the rich world of meaning in life can stand out, and can consequently be determined and appreciated. Let us consider each of these two ways in turn.

The role of science as source of inspiration in the *Philosophical Investigations* can be seen in Wittgenstein's description of the task of the philosopher — the philosopher is not someone who solves philosophical problems but someone who dissolves them. This kind of task can be traced to elements in the scientific and philosophical proposals of Heinrich Hertz. This scientist's project of dissolving unnecessary concepts in physics has been called by Peter Barker a programme of

⁵ For an extended study of the possible role of the external world in Wittgenstein's doctrine of rule-following, see L. Caruana, 'Realism and Rule-following'.

⁶ Rom Harré, 'Wittgenstein: Science and Religion', p. 235.

⁷ Harré uses this terminology on p. 225.

conceptual reform.⁸ In the *Philosophical Investigations*, Wittgenstein can be seen as continuing such a programme, this time not in science but in philosophy. To enable an appreciation of the dependence of the philosopher on the scientist, I can mention Hertz's way of dissolving some theoretical entities that for him seemed redundant. For instance, before Wittgenstein's time, he had suggested that the concept of force in physics is redundant. The problems associated with explaining what force is can therefore be easily solved by showing that the central question should not be answered but dissolved. Another example concerns the 'idle wheels' introduced by James Clarke Maxwell in his electromagnetic theory. Maxwell needed such entities to allow cells of ether spinning in opposite directions to rotate freely. Force and idle wheels were, according to Hertz, concepts with no counterparts in the real world.

This way of reasoning is what Wittgenstein appropriated and extended in his later phase, as regards the realm of philosophy. Scrutiny of our mode of using words, which leads to the clarification of the language-games being played, allows the dissolving of philosophical problems. The later Wittgenstein therefore is still within the scientific Hertzian paradigm when he presents himself as a philosopher whose task is to bring his interlocutors to see that certain linguistic elements do not deserve their familiar status. There are conceptual confusions to be eliminated. Images related to that of 'idle-wheels' seem to be present in some paragraphs of the *Philosophical Investigations*. An interesting example is §132: 'The confusions which occupy us arise when language is like an engine idling, not when it is doing its work.'

This kind of presence of the science-paradigm in the later Wittgenstein is still in the style of the *Tractatus*. Wittgenstein's use of science is essentially that of a source of inspiration. In the *Tractatus*, he had applied the model of mechanics to articulate the relation between thought and world. In the *Philosophical Investigations*, he applies to the realm of philosophy the Hertzian insistence that science be freed of unnecessary concepts. The result here is that the characteristic task of philosophy is that of dissolving problems, rather than solving them.

Science: a contrast as regards religion

The second way science is present in the later works corresponds to a role absent from the *Tractatus*. It corresponds to the role of being a *contrast* against which the rich world of meaning in life can stand out clearly. Science here is invoked by Wittgenstein not as a model but as a contrast. My claim is that this role, which is negative, is the major one in the *Philosophical Investigations*. I will support my claim by discussing two clear areas where science is an indispensable contrast for Wittgenstein. The first is the area of religion, already alluded to by Harré. The second is the area of psychology.

I start with religion. Harré insists on the importance of the religious point of view. This point of view, however, offers new perspectives only because of its being contrasted with the scientific one. Wittgenstein clarifies the religious language-game by referring to what it is wrongly associated with, namely the scientific language-game. He clarifies the vocation of philosophy itself in the same way. The contrast with science is indispensable in accomplishing this task. Consider for instance the part of the *Philosophical Investigations* where Wittgenstein discusses the nature of philosophy as therapy. He does this in a sequence of paragraphs forming a kind of

⁸ P. Barker, 'Hertz, Heinrich Rudolf (1857-94)'.

unit: §§109-133. For my purposes, the most significant statements in this section are the following:

Philosophy simply puts everything before us, and neither explains nor deduces anything. – Since everything lies open to view there is nothing to explain. For what is hidden, for example, is of no interest to us. One might also give the name ‘philosophy’ to what is possible *before* all new discoveries and inventions.

The work of the philosopher consists in assembling reminders for a particular purpose.

If one tried to advance *theses* in philosophy, it would never be possible to debate them, because everyone would agree to them. (*Philosophical Investigations* §§126-128)

Wittgenstein here is illustrating a fundamental distinction between the discipline of philosophy and that of science. The distinction lies precisely on the issue of *particular* purposes. According to him, philosophy deals with particulars in such a way that it is more personal and less scientific than what many philosophers would want to claim, especially Bertrand Russell and Gottlob Frege. Philosophy goes beyond the task of seeking an exclusively representational discourse of what lies hidden. The model of the natural sciences is not appropriate. To perceive this new vocation of philosophical work, Wittgenstein makes use of the idea of grammar. The commentator Newton Garver, who wrote an important study of this idea of grammar, explains the distinction between the *particular* interest of philosophy and the *general* interest in science:

For Wittgenstein, philosophy is nothing like science. Whereas science seeks to establish generalisations (empirical ones), philosophy seeks to break down generalisations (superficial grammatical ones). Whereas science proceeds by means of hypothesis and deductive explanation, philosophy works through the perspicuous presentation of imaginary examples and intermediate cases. Conceiving philosophy as grammar means that it is sometimes like pedagogy and sometimes like therapy, never like science.⁹

The contrastive role being played by science is essential to allow Wittgenstein explain the novel intellectual task he sees for philosophy. This task seems to be a kind of recovery of the sapiential aspect of philosophy. Philosophy as wisdom is concerned primarily with helping the person grow in virtue rather than with offering the person a true description of the hidden aspects of the world.

The idea of ‘general facts of nature’ is very important in the exploration of how Wittgenstein’s views on philosophy are situated with respect to natural science. In general, one needs to keep in mind that he discloses some of his convictions on the nature of science only indirectly. His main interest is philosophy, in so far as it is a legitimate discipline that can stand on its own feet without the support of science. In drawing distinctions, he indicates what he thinks science is in the very process of showing what philosophy isn’t. This again is a clear indication of what I’m calling using the scientific paradigm as a contrast.

The most crucial text about the general facts of nature is probably the discussion on concepts and facts. This discussion is found on page 230 of the *Philosophical Investigations*. Wittgenstein here shows his tendency to acknowledge

⁹ Newton Garver, ‘Philosophy as Grammar’, p. 151.

the importance of the facts and without being obliged, at the same time, to fix his attention exclusively on them:

If the formation of concepts can be explained by facts of nature, should we not be interested, not in grammar, but rather in that in nature which is the basis of grammar? – Our interest certainly includes the correspondence between concepts and very general facts of nature. (Such facts as mostly do not strike us because of their generality.) But our interest does not fall back upon these possible causes of the formation of concepts; we are not doing natural science; nor yet natural history – since we can also invent fictitious natural history for our purposes.

What seems to be the main point here is Wittgenstein's struggle to secure a definite area for *philosophical* concern, an area that is distinct from *representational* concerns linked to natural science. The term grammar in Wittgenstein generally refers to the set of rules that determine the correct use of a word or expression. Like facts of natural history, grammar lies right in front of our eyes, in the form of instruction in regular use of language. There is a difference between natural history and natural science. The facts of natural history lie beyond being justified or unjustified — a point explicitly mentioned and discussed in *On Certainty* § 359.

In the above paragraph quoted from the *Philosophical Investigations*, he is acknowledging that such sets of rules are related to basic features of how our world is. The fact that the weight of cheese does not change unpredictably allows various practices and excludes others. For instance, it allows our practice of weighing cheese for buying and selling. And this practice, in turn, provides the occasion for various language-games. There are, one may say, some constraints on practices and on concepts, and some of these constraints are not merely conventional but natural. It is a contingent fact that there is a world containing humans and their grammars. A fictitious set of such constraints will allow simplified and naive language-games to be analysed. Wittgenstein, however, is interested in real, or natural, language. Any fictitious situations he introduces, for example in the first paragraphs of the *Philosophical Investigations*, are all intended as a starter. They are meant to help in understanding language-games that are *found* rather than invented.¹⁰

The grammar of real language-games reflect something of the world. Some famous quotes make this clear: 'essence is expressed by grammar' (*Philosophical Investigations* §371); 'grammar tells us what kind of object anything is.' (*Philosophical Investigations* §373). Natural science involves a grammar that expresses natural essences. For instance, a typical science statement could be: 'Since it is a fish, it cannot live long out of water.' This statement expresses certain natural limits on practice, linguistic or otherwise. Other statements may have the same structure, but with constraints that seem scientifically natural but are not. For instance, moral 'essences' can be expressed by a statement like: 'You cannot go there, it is private property.' Grammar of the first kind seems to be ultimately dependent on our way of handling objects around us. This is the realm of natural science. Grammar of the second kind seem to be dependent on our way of living together with a specific aim in view, say to live peacefully and happily.¹¹ In such crucial discussions, the role of science is always central. For Wittgenstein, realising how scientific discourse

¹⁰ I explore in greater detail the idea of natural, or non-conventional, constraints on practices in L. Caruana, *Holism and the Understanding of Science*, chapter 7.

¹¹ I am indebted to Garver for this example; see Garver, 'Philosophy as Grammar', p. 160.

works is essential in opening the eyes of his readers to see how other kinds of discourse should differ.

These general remarks on the contrastive role of science as regards the nature of philosophy are relevant also to the particular case of religious language-games. If science plays an important contrastive role in our understanding of philosophy, it plays a similarly inevitable contrastive role in our understanding of religion.

To appreciate Wittgenstein's views on religious language-games, some sections of the *Philosophical Investigations* are quite useful. However, some sections from his other writings seem more explicit. For instance, in the collection entitled *Lectures and Conversations on Aesthetics, Psychology and Religious Belief*, he is quoted as lecturing explicitly on the distance between the two language-games of science and religion. He insists that artificial intimacy between these two language-games is quite ridiculous:

I have a moderate education, as all of you have, and therefore know what is meant by insufficient evidence for a forecast. Suppose someone dreamt of the Last Judgement, and said he now knows what it would be like. Suppose someone said: "This is poor evidence." I would say: "If you want to compare it with the evidence for it's raining tomorrow it is no evidence at all." He may make it sound as if by stretching the point you may call it evidence. But it may be more than ridiculous as evidence. But now, would I be prepared to say: "You are basing your belief on extremely slender evidence, to put it mildly." Why should I regard this dream as evidence — measuring the validity as though I were measuring the validity of the evidence for meteorological events? If you compare it with anything in Science which we call evidence, you can't credit that anyone could soberly argue: "Well, I had this dream ... therefore ... Last Judgement". You might say: "For a blunder, that's too big."¹²

The main argument in this paragraph is quite typical. The language-game involving 'Last Judgement' is being compared with that involving an empirical question about raining tomorrow. The analysis brings out the real temptation of trying to have a univocal concept of evidence that is the same in both language-games. The temptation results in comparing the strength of the evidence for an affirmation in one language-game with that of an affirmation in the other. One could say that David Hume's arguments about religion are typical confusions of this kind. Wittgenstein continues by referring to blunders, some of which, he seems to say, are understandable, others less so. Confusing the concept of evidence in the religious language-game with that in the scientific language-game does not constitute an understandable blunder. It constitutes a big blunder. He explains what he calls a big blunder by recalling what happens when someone announces that he wants to add and then says that 2 and 21 is 13. This is too outlandish, too clumsy, for a blunder. We recognise that there are limits to the deviations that can be considered understandable blunders.

Wittgenstein's main contribution here concerns the workings of the religious language-game as compared to that of science. He has hard words for those who would like to make religious belief look like science. To try to justify religious claims by the same methods that are used in natural science is not only a confusing strategy, but also a big blunder. It would be incorrect even to hold that religious language is unreasonable. Reasonable and unreasonable are concepts tainted with natural science,

¹² L. Wittgenstein, *Lectures and Conversations on Aesthetics, Psychology and Religious Belief*, pp. 61-62.

to such an extent that we are tempted to think that only discourses meant to describe the hidden aspect of the world are reasonable. The religious language-game has a different kind of role. What people do with words in the religious language-game often goes beyond the attempt to be reasonable in this limited sense. It very often has to do with expressing personal commitment.¹³

The contrastive role that science is playing in such a philosophical inquiry is clear. Together with what was said in the previous discussions concerning philosophy in general, this point on religion gives convincing evidence that science is indeed present in the later works of Wittgenstein, its role being that of a contrast.

Science: a contrast as regards psychology

The use of science as a contrast is also very evident in the references that Wittgenstein makes to the work of William James. In recent scholarship, it has become very clear how this latter philosopher-psychologist had lasting influence on Wittgenstein, especially through his works *The Principles of Psychology* and *Varieties of Religious Experience*.¹⁴ There are clear indications that Wittgenstein admired James on a number of points. On some fronts, however, there was a clear disagreement. This point is crucial for my argument as another illustration of how, in the *Philosophical Investigations*, the scientific paradigm is present just as much as in the *Tractatus*, but this time as a contrast rather than as a source of inspiration.

I will mention three examples of the contrast between Wittgenstein and James. The first concerns pain as an object of philosophical study. James sees himself analysing not the thing itself, but our experience of the thing: in other words, what he sometimes calls the phenomenon. Wittgenstein, on the contrary, inherits from the Kantian tradition and concentrates on concepts. The concept, for him, is evident in the use of the word that we use as an instrument. In the *Philosophical Investigations*, this is clear in his detailed discussion on the relation between words and objects, roughly paragraphs 363 to 397. The more explicit remarks are:

383. We are not analysing a phenomenon (e.g. thought) but a concept (e.g. that of thinking), and therefore the use of a word. So it may look as if what we were doing were Nominalism. Nominalists make the mistake of interpreting all words as *names*, and so of not really describing their use, but only, so to speak, giving a paper draft on such a description.

384. You learned the *concept* 'pain' when you learned language.

It is evident here that Wittgenstein is trying desperately to distance himself from James' empirical approach. He is denying the existence of a hidden reality to be made explicit through study and to be eventually called the 'pain-experience' as a referent to the word 'pain'. He is trying to distance himself from James without falling into the quagmire of Nominalism. The essential point I want to highlight here is the indispensable role that James' style is playing in the very articulation of Wittgenstein's original views. The contrastive role of the scientific or empirical stance is all important for him.

The second example of the contrast between Wittgenstein and James worth

¹³ In Wittgenstein's own words: 'Anyone who reads the Epistles will find it said: not only that it is not reasonable, but that it is folly. Not only is it not reasonable, but it doesn't pretend to be.' See: L. Wittgenstein, *Lectures and Conversations on Aesthetics, Psychology and Religious Belief*, p. 58.

¹⁴ Much useful material on this point can be found in Russell B. Goodman, *Wittgenstein and William James*.

mentioning concerns conscience. The major section on conscience in the *Philosophical Investigations* is situated from paragraph 412 to paragraph 427. Consider the direct reference that Wittgenstein makes to the attitudes of William James:

413. Here we have a case of introspection, not unlike that from which William James got the idea that the 'self' consisted mainly of 'peculiar motions in the head and between the head and throat'. And James' introspection shewed, not the meaning of the word "self" (so far as it means something like "person", "human being", "he himself", "I myself"), nor any analysis of such a thing, but the state of a philosopher's attention when he says the word "self" to himself and tries to analyse its meaning. (And a good deal can be learned from this.)

This is a typical example of a clash of attitudes, a clash between James' empiricism and Wittgenstein's innovative conceptual analysis. James presents his long-worded, apparently confused views in a chapter called 'The Consciousness of Self'. He employs introspection as a method with the aim of arriving at a knowledge of the self. The basic idea is to consider the self as an object of study just as, say, the stomach can be an object of study. To a certain extent, I can study my own stomach and then compare my results with what has been observed and deduced by others engaged on the same project of studying the function of their stomach. The same can be said, according to James, about the self. I can study the self, this time not via direct experimentation but via a method appropriate for this object, namely introspection, and then I can also compare and discuss my results with those of others.

Wittgenstein sees a serious flaw in this procedure. The problem is not because James should have applied another method to study the self. The problem lies deeper. The very attitude of James involves assuming that the self is an object we can stand apart from and scrutinise. This is mistaken. It simply does not help to go through the steps of the procedure that has proved so effective for empirical discovery. If there is no object 'self', there is nothing to discover in this way. Blindly applying the procedure for the case of the self is like going through the motions of weaving a piece of cloth even though the loom is empty, and then concluding that, since you have gone through all the motions, there must result a piece of cloth.

Yet again, we see how natural science is playing a fundamental role in the reasoning that fashions the basic characteristics of the Wittgenstein's later philosophy. Its role here is quite different from that in the *Tractatus*. Here, natural science, as exemplified by James' use of introspection to study the self, is used by Wittgenstein as a contrast. He is practically saying: look at natural science, and look at what is happening in the language-game of the self. The latter is healthy when it is not like the former.

As a third and final example of the contrast between Wittgenstein and James I will consider the will. Wittgenstein's discussion on the nature of the will offers another example of the significant contrastive role natural science plays in his later works. The contrast involves two modes of explanation, one exemplified by William James and the other by Wittgenstein himself. James holds a general empiricist view that makes him look for something positive to say about the will, even though there is manifestly no single experience of willing. For James, there is only experience. Any kind of investigation is one of exploring the experience marked out by the term 'will'. Wittgenstein's position is diametrically opposed to this. The significant point I want

to highlight is that Wittgenstein's view on the will becomes discernible and eventually clear *when contrasted with* the empirical view exemplified by James. Wittgenstein avoids the method of the natural sciences because he discovered that in some areas, especially in psychology, the empirical stance distorts our investigations and bewitches us into error. He wants to free himself from what he sees as the logic in which James was enclosed. He does this by reorienting the discussion from phenomena and experience to concepts.

James investigates a particular act of willing, namely willing to move oneself, for instance the act of willing to get out of bed in the morning. He insists that there is no feeling of outgoing energy in intentional action. In a sense therefore he accepts the fact that the will is not a material object and can produce measurable effects such as energy. In spite of this, however, he still tries to identify a hidden entity of some kind that explains why we want to do one thing rather than another. He calls this hidden reality a 'kinaesthetic idea'.¹⁵ Although James escapes the materialist pitfall, he still limits his method to that of empirical science. He still engages in a search for a hidden theoretical entity, an experience, behind the phenomena. It is this more subtle stance in his method that comes under attack by Wittgenstein. We find an allusion to this attack in paragraph 621 of the *Philosophical Investigations*:

Let us not forget this: when "I raise my arm," my arm goes up. And the problem arises: what is left over if I subtract the fact that my arm goes up from the fact that I raise my arm?
((Are the kinaesthetic sensation my willing?)).

The questions here are directed to someone like James. The use of the term 'kinaesthetic' strongly suggests that Wittgenstein had James in mind. The answer is no to both questions, because the place to search for an understanding of the will is not the experiential realm but the philosophical, conceptual realm. The investigation therefore should not be about what is referred to by the term 'will' but about how the word is used. The distinction between science and philosophy is here essential. The correct philosophical understanding of the will becomes evident when it is contrasted with natural science. The contrast brings out the methodological contamination of the former by the latter. This is sometimes made very explicit in the *Philosophical Investigations*, for instance:

654. Our mistake is to look for an explanation where we ought to look at what happens as a 'proto-phenomenon'. That is, where we ought to have said: *this language-game is played*.
655. The question is not one of explaining a language-game by means of our experiences, but of noting a language-game.

It is obvious by now that the will, like many other psychological concepts, is an everyday concept. These concepts are related to one another and constitute what has come to be called folk-psychology. They are not concepts newly fashioned by science for its own purpose, as are most of the concepts of physics and chemistry. 'Psychological concepts are related to those of the exact sciences as the concepts of the science of medicine are to those of old women who spend their time nursing the sick.'¹⁶ Here again the role of science for the philosopher is clear. Science examines

¹⁵ Mentioned in B. Goodman, *Wittgenstein and William James*, pp. 78-85.

¹⁶ L. Wittgenstein, *Lectures on the Philosophy of Psychology*, volume 2, §62.

the world from one end, philosophical psychology from the other.

There are ample reasons, therefore, to show that science is very much present in the later Wittgenstein and that it is present as a contrast. I have concentrated mainly on the contrastive role it plays as regards religion, and the contrastive role it plays as regards psychology. This may be enough to illustrate the insufficiency of Har  's proposal that the later Wittgenstein was moved by religion just as the first was moved by science. Another interesting dimension, however, regarding science in the later works can be worth exploring. This involves a brief survey of the legacy of the later Wittgenstein in the area of science-studies.

Repercussions on science-studies

The way that science plays a contrastive role in the *Philosophical Investigations* has left its traces in the resulting developments issuing from Wittgenstein's work. I will start by mentioning briefly an example dealing with the very methods of science, and then will proceed by giving other examples related to history and sociology of science.

The first example concerns Wittgenstein's original doctrine of family resemblance. Wittgenstein famously examines the case of 'game' to illustrate the invalidity of our normal everyday assumption concerning the essence of things made evident by the words we use. It is not true that our use of the word implies that there *must* be some element in common to all: 'if you look at them you will not see something that is common to *all*, but similarities, relationships, and a whole series of them at that.' (*Philosophical Investigations* §66). What Wittgenstein highlights is the complicated network of such similarities overlapping and criss-crossing across the various members of the set — sometimes, as he says, overall similarities, sometimes similarities of detail. The contrast at the background of this idea is a certain craving for generality associated with the success of natural science. Wittgenstein is essentially saying: do not assume, as you usually do, that properties are ingredients of the things that have the properties; do not assume that, because, for instance, alcohol is an ingredient of both beer and wine, then all other cases of properties and kinds can be considered on the same lines.

This contrastive role of science has had some influence on scientific method, especially in the area of definitions. Botanical taxonomists are familiar with challenging situations involving a multiplicity of possible features to be taken into consideration. Wittgenstein's introduction of the family resemblance model has been a useful conceptual tool. The complexity of the material world is such that it does not pay to adopt a purely realistic starting point, according to which all members identifiable by a single term have something in common that lies hidden. Some of the botanist's classifications are fuzzier than we think. For instance, if we take leaves with five distinguishable features ABCDE, then individuals within a group could be such that they have the following features: ABCD, BCDE, CDEA, DEAB, EABC. These five individuals each has four features and lacks the fifth. The missing feature is different in each of the individuals. The family resemblance model has brought to light that most scientific definitions specify non essential attributes of which a sufficient number must be present for the definition to be used correctly. Botanists, for example, often adopt a taxonomical approach that may be called cluster analysis. Admittedly, Wittgenstein's original paradigm example, namely games, does not

constitute a classification concerned with natural objects. Games are not natural kinds. They form a group within cultural space. Games are discovered ready-made by a given generation as elements or conventions inherited from previous generations. They are then adopted or transformed. In spite of this, however, its applicability to real objects have been recognised and developed. The basic point I want to make is that the way that science plays a contrastive role in the *Philosophical Investigations* has left its traces in the resulting developments issuing from Wittgenstein's work.¹⁷

Other traces can be discerned in the area of the history and sociology of science. It is a well-known fact that Wittgenstein became aware of the need to surpass the limitations of a systematic scientism applied to language and logic. Many of his arguments are intended as a way of bringing to light the self-destructive nature of logical positivism. As has been said, with the *Philosophical Investigations*, the role of natural science becomes a contrast against which a number of new approaches become available. The locus of meaning shifts drastically towards the practice of the community of language-users. This shift has had a dramatic effect on science-studies.

One of the first philosophers of science to exploit the ideas in the *Philosophical Investigations* was Norwood Russell Hanson in the late fifties.¹⁸ He challenged the reductive presuppositions of empiricism by applying the Wittgensteinian analysis of 'seeing as'. He concluded that traditional empiricist and positivist teachings were completely inadequate. They emphasised justification and verification, and neglected the aspect of discovery, innovation and creativity — features that are evident in periods of rapid scientific development. In other words, he was worried about the tendency to limit science-studies to methods inspired by Russell's logical constructionism. He recognised the serious limitations of those who proceeded according to the main guiding principle of Russell's *Principia Mathematica*.

Hanson therefore started considering the traditional empiricist doctrine as a contrast against which he could discern a deeper and more responsible way of understanding science. He began to concentrate on the basic experience of perception and started with Wittgenstein. He started with the point that seeing is not only the having of a visual experience; it is also the way in which the visual experience is had. Seeing is therefore not simply a passive collection of data. For any two observers, there may be a common object to perceive, but their experience is always individual. An experience as such is beyond being correct or incorrect. Any two scientists interpret an event through their personal set of background beliefs. Ptolemy would have had the same retinal image as Copernicus, but the former would have seen the moving sun, the latter an apparent motion due to the Earth's diurnal rotation.

Hanson applied Wittgenstein's basic drive towards considering science as a contrast to arrive at the now-famous idea that observation is theory-laden. This is a repudiation of the distinction between fact and theory, a repudiation of a major point that was so dear to positivism. Taken to the extreme, denying the distinction between fact and theory can lead to relativism. Observation becomes completely dependent on the set of background beliefs. This set gains extreme importance, not only in the elaboration of the theory but also in the choice and perception of the facts. The result is that questions about truth dissolve. If competing theories are considered equivalent

¹⁷ On this point, I have drawn inspiration from R. Bambrough, 'Universals and Family-Resemblances'.

¹⁸ N.R. Hanson, *Patterns of Discovery*. For this historical section of my argument, useful sources of information were: George MacDonald Ross, 'Science and Philosophy'; M.J.S. Hodge and G.N. Cantor, 'The Development of Philosophy of Science since 1900'.

to ‘incommensurable’ language-games, there is no room for truth. Hanson’s drift away from the strictly empirical picture of science-studies left the door open to subsequent fragmentation of science. Such fragmentation was never the intention of Wittgenstein.

After Hanson’s work, the next significant figure was T.S. Kuhn. Historians identify a significant link between Wittgenstein, Hanson and Kuhn, and some even use the term the ‘Wittgenstein-Hanson-Kuhn tradition’.¹⁹ There can be little doubt that many of Kuhn’s central notions are derived from Wittgenstein via Hanson. The contrastive role science played in Wittgenstein’s later works was a source of considerable inspiration for Kuhn’s exploration of the area neglected by the positivistic approach of philosophers like Karl Popper. For instance, Kuhn’s celebrated term ‘paradigm’ has roots in Wittgenstein’s later works. In Kuhn’s *The Structure of Scientific Revolutions* we find a chapter on the priority of paradigms that includes the following section:

What can the phrase ‘direct inspection of paradigms’ mean? Partial answers to questions like these were developed by the late Ludwig Wittgenstein, though in a very different context. Because that context is both more elementary and more familiar, it will help to consider his form of the argument first.²⁰

Kuhn proceeds by discussing the nature of paradigms in terms of family resemblance between the various research problems and techniques that arise within a particular period of time. The point I would like to highlight here is not the content of Kuhn’s thesis, which is well known, but his way of reasoning. Kuhn expresses his ideas in the same way as Wittgenstein in the sense that he struggles to explain his new, historically rich and nuanced view by using positivistically understood science as a contrast. In the introduction to the 1962 edition of his book, he confesses that he ‘may even seem to have violated the very influential contemporary distinction between “the context of discovery” and “the context of justification”’.²¹ He sees himself to be someone who had been weaned intellectually from such distinctions and others like them.

One can say therefore that Kuhn, in a certain sense, built upon foundations that reach back to the scientific content of Wittgenstein’s *Philosophical Investigations*. The same can be said of the author mentioned previously, namely Hanson. Such observations offer considerable support to my claim that the contrastive role of science in the *Philosophical Investigations* has left its traces in the resulting developments issuing from Wittgenstein’s work.

3. Concluding comments

The original aim of this paper was to study the interaction between science and philosophy. This was carried out by engaging in a case-study involving Wittgenstein’s work. The central question was: what role is science playing in the philosophical work of this author? In the first section, about the *Tractatus*, I

¹⁹ See M.J.S. Hodge and G.N. Cantor, ‘The Development of Philosophy of Science since 1900’, p. 848. One must recall as well, however, that Kuhn does not depend solely on Wittgenstein but adds elements derived from Jean Piaget’s theory of child development, from comparative linguistics and from other disciplines. See P. Hoyningen-Huene, *Reconstructing Scientific Revolutions: Thomas S. Kuhn’s Philosophy of Science*.

²⁰ T.S. Kuhn, *Structure of Scientific Revolutions*, p. 44.

²¹ T.S. Kuhn, *Structure of Scientific Revolutions*, p. 8-9.

introduced Harré's recent thesis according to which there is a clear difference between the driving forces behind the early and the later Wittgenstein. This proposal has it that, in the early work, the major inspiration came from science, while, in the later, it came from religion. I examined the *Tractatus* doctrine on three issues, namely the picture theory, the theory of truth-functions, and the account of the meaning of propositions, and concluded that Harré is justified in his claim as regards this book. There was certainly more influence on the early Wittgenstein arising from the ideas of Heinrich Hertz and other scientists than from those of Russell. I then extended this kind of investigation, and supplied some more support to Harré's claim, by analysing section 6.3 of the *Tractatus*, the section that deals directly with science.

In section two of this paper I developed a critique of Harré's other proposal, namely that the driving force behind the Wittgenstein's later work was religion. My claim was that he is misleading because he gives the impression that natural science plays only an insignificant or even negligible role in the later works. The scientific paradigm, however, is there. Its presence is visible in two distinct ways. The first way corresponds to the same role science plays in the *Tractatus*, namely the role of a *source of inspiration* from which Wittgenstein could draw useful models for a philosophical representation of the world. The second way corresponds to the role of being a *contrast* against which the rich world of meaning in life can be discerned. I examined this contrastive role both as regards religion and as regards psychology. To offer further support for my case against Harré's simple dichotomy, I offered a brief overview of the significant repercussions of the scientific content of Wittgenstein's later work. What I had identified as a contrastive role for science in the *Philosophical Investigations* gave rise to a contrast within scientific study itself. It gave rise to a contrast between methodological analysis, broadly in line with logical-positivism, and historical and social analyses of scientific development.

A final word may now be added as regards the value of this case study. In what sense can the interaction between science and philosophy in Wittgenstein's case be useful in understanding their interaction in general? The broad nature of this question allows a reply that is mainly in the form of a suggestion rather than in the form of a definitive statement. The suggestion I would like to make is that the distinction between science as source of inspiration and science as a contrast, as has been seen in the case of Wittgenstein, is a distinction that characterises much philosophical work in this area in the twentieth century. In the face of the advances of natural science, various cultural forces find philosophical expression either as 'friends' or as 'enemies'. They find philosophical expression either as building on what science has discovered or as exposing the limitations of the scientific discipline. They find philosophical expression either as appreciating the rigour and universality characterising the aspiration of science or as disclaiming the deformities it inevitably brings about as regards what is fully human. It is very significant that the interaction between science and philosophy, as shown in the case of Wittgenstein, often involves the religious dimension. Going beyond science is often considered a religious quest. Philosophers are often in a good position to evaluate the mentality that results from scientific developments. They can recognise the good aspects and the bad. On the one hand, they can discern how scientific models that have been fruitful in describing the material world may also be applicable to other realms. On the other hand, they can perceive also how an exclusively scientific-technological culture is often destructive of human and spiritual values. Being aware of the different possible roles of science

with respect to philosophy, for instance the role of science as source of inspiration or as contrast, helps in this crucial discernment.

References

- Bambrough, R., 'Universals and Family-Resemblances', *Proceedings of the Aristotelian Society* 61, (1960-61), pp. 207-222.
- Barker, P., 'Hertz, Heinrich Rudolf (1857-94)', *Routledge Encyclopaedia of Philosophy*, E. Craig (ed.), London: Routledge, 1998-, vol. 4, pp. 400-402.
- 'Hertz and Wittgenstein', *Studies in History and Philosophy of Science* vol. 11, 1980, pp. 243-56.
- Caruana, L., 'Realism and Rule-following', in: *Normatività, fatti, valori*, R. Egidi, M. Dell'Utri, M. De Caro (eds.), Macerata: Quodlibet 2003, pp. 143-152.
- *Holism and the Understanding of Science*, Aldershot: Ashgate, 2000.
- Garver, N., 'Philosophy as Grammar' in: *The Cambridge Companion to Wittgenstein*, H. Sluga, D.G. Stern (eds.), Cambridge: Cambridge University Press, 1996.
- Goodman, R.B., *Wittgenstein and William James*, Cambridge: Cambridge University Press, 2002.
- Hamilton, K., *Hertz and Wittgenstein: The Philosophical Significance of Wittgenstein's Scientific Training*, Ph.D. dissertation, University of Notre Dame, IN., 1994.
- Hanson, N.R., *Patterns of Discovery*, Cambridge: Cambridge University Press, 1958.
- Harré, Rom, 'Wittgenstein: Science and Religion', *Philosophy* vol. 76, 2001, pp. 211-237.
- Hodge, M.J.S. and Cantor, G.N., 'The Development of Philosophy of Science since 1900', in: *A Companion to the History of Modern Science*, R.C. Olby, G.N. Cantor, J.R.R. Christie & M.J.S. Hodge, Routledge, 1996, pp. 838-852.
- Hoyningen-Huene, P., *Reconstructing Scientific Revolutions: Thomas S. Kuhn's Philosophy of Science*, Chicago: University of Chicago Press, 1993.
- Kuhn, T.S., *Structure of Scientific Revolutions*, Chicago: University of Chicago Press, 1962.
- MacDonald Ross, George, 'Science and Philosophy', in: *A Companion to the History of Modern Science*, R.C. Olby, G.N. Cantor, J.R.R. Christie & M.J.S. Hodge, Routledge, 1996, pp. 799-815.
- Malcolm, N., *Wittgenstein: a religious point of view?* London: Routledge, 1993.
- Thomas Aquinas, *Selected Philosophical Writings*, T. McDermott (ed.), Oxford: Oxford University Press, 1993.
- Wittgenstein, L., *Tractatus Logico-Philosophicus*, trans. D. F. Pears and B. F. McGuinness, London: Routledge and Kegan Paul, 1961.
- *Philosophical Investigations*, trans. G. E. M. Anscombe, Oxford: Blackwell, 1953.
- *On Certainty*, trans. D. Paul and G. E. M. Anscombe, Oxford: Blackwell, 1969.
- *Lectures on the Philosophy of Psychology*, volumes 1 and 2, edited by G.H. von Wright and H. Nyman, trans. C.G. Luckhardt and M.A.E. Aue, Chicago: University of Chicago Press, Basil Blackwell, 1980.
- *Lectures and Conversations on Aesthetics, Psychology and Religious Belief*, ed. Cyril Barrett, California: University of California Press, 1967.